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LANGUAGE PROFILES OF THIRTY-NINE CHILDREN WHO STUTTER GROUPED BY PERFORMANCE OF A MOTOR PROBLEMS INVENTORY

A Thesis

Presented to the

Faculty of

California State College, Fullerton

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

in

Speech

---

by

Jeanna Riley

June 1971

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ABSTRACT

The purpose of this study was to compare the language parameters of children who stutter and who have low motor coordination abilities to stuttering children with normal motor coordination abilities.

Thirty-nine children who stuttered were administered the Stuttering Severity test, the Illinois Test of Psycho-linguistic Abilities, and the Motor Problems Inventory. The stutterers were then divided into three groups according to their ability to perform on the motor test. The fifteen stutterers who demonstrated little or no motor problems formed the Control Group; the ten stutterers who showed moderate motor problems were the Experimental Group One and the fourteen stutterers who exhibited the most motor problems on the motor test were placed in Experimental Group Two. Results for each ITPA sub-test and for the total language ability were analyzed for significant differences using the Mann-Whitney U procedure.

All groups scored low on verbal expression. Children with moderate coordination problems scored low on visual reception, auditory association, grammar and total language. Children with extreme coordination problems scored low on auditory association, grammar, auditory and visual memory and very low on total language.

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CHAPTER I

REVIEW OF THE LITERATURE AND HYPOTHESIS

Background

Stuttering has remained a puzzle with many missing pieces. No one stutterer "fits" into all the available theories nor does one theory explain all stutterers. In attempting to reach a "conclusive" and "inclusive" theory, certain data are often neglected or over-looked. The unitary theory has been the dominant approach in research, stated or implied. The unitary approach is a term used to describe the application of a single theory to all stutterers. The implication is that the causation proposed can explain the related behavior of all stutterers.

When the main theories are reviewed, it is useful to classify the findings in three broad categories; developmental (Johnson, 1942; Leutenegger, 1955; Bloodstein, 1965; Wischner, 1948), intra- and interpersonal (Coriat, 1942; Sheehan, 1954; Bender, 1942; Murphy, 1960; Glasner, 1953; Douglass and Quarrington, 1952), and organic (Travis, 1931; West, 1958; Karlin, 1959; Weiss, 1950; Bryngelson, 1958).

Varying research lends support for each of these areas. However, there also exists contradictory evidence

for each. Not all authors adhere to the single causation theory. Some have proposed the idea that two or more etiologies may exist and that no unitary theory can account for all the known facts concerning stutterers (Luchsinger and Arnold, 1965; Robinson, 1964). A two cause theory was maintained by Boome (1941). He viewed the instability of the nervous system as a predisposing factor to stuttering. He listed environmental influences to be the other cause. Bluemel, (1957) distinguishes between two types of stuttering which he describes as non-organized and disorganized speech. He labels them stuttering and stammering, respectively. Wyke (1969) describes two clinical types, voluntary stammerers and reflex stammerers.

The efforts to employ a single major theory could be a hindrance to accomplishing definitive and meaningful research. In a recent book by Beech and Fransella, (1968, p. 1) a comprehensive survey of the available research is made, in which they state:

> Part of the problem of conducting research and therapy in the field of stuttering may stem from the kinds of assumptions which are made in advance of experimental evidence. Perhaps the most obvious of these, and one which is undoubtedly easiest to make, is that stuttering is a unitary disorder and that stutterers belong to a particular class of individuals in a more fundamental sense than that they are all prone to experience difficulty in speaking.

Could the often reported "no significant difference" found in many experimental studies result from an

invalid evaluation due to the lack of differentially diagnosing the stutterer? Beech and Fransella (1968, p. 94) note that the "large variability among stutterer's responses to various experimental conditions is a constantly recurring theme throughout the literature." The majority of experimental studies have compared a stuttering population with a normal population although several studies have clearly indicated that often there have been greater differences among stutterers than between the stutterers and the normal population (St. Onge and Calvert, 1964; McCrosky, 1957; Knott, et al., 1959; Starr, 1922).

One explanation for the differences found may be the given type of population studied. The nature of a given facility may account for the high concentration of a similar type of stutterer. A clinic administered under the auspices of a psychology department, for example, will probably attract stutterers who by introspection or referral exhibit emotional problems. On the other hand, a clinic in a hospital setting would tend to receive stutterers by medical referral. Another factor that could effect test results is that adult stutterers have masked many features which are noted in children who stutter. Motor problems may be outgrown or compensated, a strong emotional overlay may have developed, and the relationship between motor and emotional problems may no longer be readily discernable. At the adult age, it can be difficult to know whether the stutterer

is primarily reacting to his stuttering or if his stuttering is a reaction to his emotional status. The optimum ages for testing motor and language factors are four through eleven because most instruments are designed for these ages. Therefore, children who stutter are able to present less distorted information concerning selected factors than adults who stutter.

It would seem that the persistent assumption in research is that stutterers are a homogeneous group, in spite of significant evidence to the contrary. Trends and even significant differences may be masked and eliminated by failing to classify stutterers into meaningful sub-groups. Arnold (1965, p. 622) states:

> We should recognize first that there are various types of stuttering of psychogenic, neurogenic and biogenic origin. This leads to diagnostic distinction of its main types. . . .

Motor Factors Among Stutterers

When stutterers are differentially diagnosed, one of the sub-groups that emerges is found to demonstrate greater motorical inability than other stutterers. When they are not differentially diagnosed, the research exhibits a widespread variability.

Following are some of the studies that concern motor and neurological development of stutterers. Kopp (1943) investigated 450 stutterers using the Oseretsky test and found a positive relationship between stutterers and motor

incoordination. She concludes that heredity defects affecting motor disturbances are found in "constitutional" stuttering and are also somewhat present when stuttering is acquired. The fact that it was not a double blind study and that the examiner's subjectivity affects the score on the Oseretsky, could have influenced the results. In an attempt to duplicate Kopp's study, with some modifications, Finklestein and Weisberger (1954) found that the stutterers were slightly superior in motorical ability than the non-stutterers. Simon (1945) found that stutterers demonstrated motorical "disintegration" in a series of complex tests that he devised. On the other hand, Ross's (1955) finding did not support this evidence when he attempted duplication of the study. Stuttering severity and anxiety involvement were the criteria used by Snyder (1958) to sub-divide the groups. Stuttering and coordination were tested with the following results; the moderate and severe stutterers scored significantly below the control in all but one test. In an earlier study, Cross (1936) noted no significant difference in the motor capacities of stutterers and non-stutterers but he did find that stutterers had more difficulty with repetitive lip, tongue and jaw movements. However, Spriestersbach (1940) did not support these findings with his study. In regard to large muscle abilities, Bilto (1941) found stutterers to be inferior to children with normal speech. Wesphal (1933) had previously noted no

difference.

The contradictory evidence concerning the motor abilities of stutterers continues to be common in the research studies of the early 1900s. For example, regarding rhythmic voluntary movements, some investigators have found stutterers to be inferior (Blackburn, 1931; Hunsley, 1937) while others have reported that no significant differences existed (Seth, 1934; Kriegman, 1944). In a study designed to determine the relationship of stuttering to mental fatigue, Bills (1934) concluded that there was a correlation between delayed reaction and stuttering. He postulated that there was a common neurological basis which effected the loss of control or coordination.

In a more recent study, Adams and Dietze (1965) reported that the reaction times of stutterers to word associations were slower than non-stutterers. Rotter (1955) investigated to determine the ability of stutterers to sort cards with the right and left hands. He found them to be inferior to non-stutterers.

Regarding repetitive manual reaction, West's (1929) study showed a positive relationship between stutterers and a manual inability. Strother and Kriegman (1944) found no arrhythomokinesis among stutterers. In another study, concerning diadochokinesis, Strothers and Kreigman (1943) reported that stutterers were superior to non-stutterers, although not significantly.

A few studies have been done concerning eye movements of stutterers. Positive correlations between irregular eye movements and stutterers have been found by several investigators (Murray, 1932; Jasper and Murray, 1932; Strother, 1937; Moser, 1938).

The wide range of findings, though extensive, is overlapping and ill-defined. Confusion has continued to result in the research when attempts to correlate motor problems with stuttering have been made. A review of the literature reveals a variety of reasons for confusion. A variation of instruments has been employed to test the same type of problem; techniques as well as populations have differered as studies on similar performances have been conducted. The results have been as varied as the instruments, techniques and populations that have been used. For example, the rhythmical movements of stutterers in Blackburn's early study (1931) were tested by the use of a kymographic recording technique and the stutterers were found to be inferior while Strother and Kriegman (1944) in their later study of rhythm among stutterers used a tambour on plate as measurement. They found that stutterers were slightly superior to nonstutterers. Many other studies could be cited. A study that demonstrates a difference in the number of population used and a possible difference in interpreting the same instrument is in the Finklestein and Weisberger (1954) duplication of the Kopp

study (1943). Opposing results were obtained.

The term "motor" has been used to describe a wide scope of neuromuscular activity. The less obvious motor dysfunctions frequently remained undetected. It has been noted that "soft" neurological signs may exist in a child that are not detected by the classical neurological examination. Arnold (1960, p. 25) describes these problems as "micro-neurologic" or a "sub-clinical dysfunction." Another term developed to describe them is "sub-clinical diffuse organic involvement" (de Hirsch, 1960, p. 47). Stutterers are differentiated from other stutterers by means of clinical observations. These observations lack support of definitive and empirical research studies.

The application of recently developed measurements of minimal motor problems may well help clarify the characteristics of these children. Stutterers who demonstrate moderate or severe motor coordination difficulties may present quite a different language syndrome than stutterers who do not have motor problems.

Language Factors Among Stutterers

The study of a central language problem in stutterers has been limited to the "clutter-stuttering" syndrome. Arnold, (Luchsinger, and Arnold, 1965) describes the central language disorder noted in clutter-stutterers in detail. Both Arnold and Weiss (1964) view the language

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imbalance as being congenital in etiology. Several studies support this, including the gemellogic investigations by Luchsinger, 1940, 1944, 1955; Hanbert, 1947; Seeman, 1937, 1959; Schmidt, 1940.[1] The syndrome is composed of dysgrammatism, short auditory memory attention span, disorganized language formulation and delayed language. Concomitant symptoms consist of delayed motor maturation and laterality disorders.

While language ability in relation to stuttering has not been investigated, correlation of single language factors and stuttering has been noted. For example, the auditory processing ability of stutterers. The results have varied. No significant difference was found between adult non-stutterers and adult stutterers when tested for auditory central nervous system disorders (Gregory, 1964). In testing the visual and auditory abilities of stutterers vs. non-stutterers on a task involving slurvianisms, Wingate (1967) noted that both groups did less well on the auditory aspect but stutterers performed significantly lower.

The assumption that stutterers have a defective auditory feedback system continues to be the object of much research (Shane, 1955; Cherry and Sayers, 1956; Chase, 1958; Mysak, 1960). At this point, more studies have been concerned with the use of delayed auditory feedback (DAF) and

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[1]Studies cited by Arnold.

its effect upon the normal population as well as upon stutterers than with the actual investigation of the presence of defective auditory feedback in stutterers (Lee, 1950; Black, 1951; Maraist and Hutton, 1957; Neelley, 1961; Sutton and Chase, 1961; Goldiamond, 1966). The disturbed feedback may persist among some stutterers while not present in others. This may account for the fact that speaking slower than usual benefits some stutterers but does not seem to effect others (Soderberg, 1968).

Soderberg's (1967) research on the linguistic factors in stuttering, notes that uncertainty of grammatic structure may be related to stuttering in young children. A study by Bloodstein and Gantwerk (1967) referred to grammatical function and stutterers. However, the emphasis was placed on the frequency of stuttered speech on grammatical parts of speech.

Clinical observations have supported the evidence that some stutterers have language problems. It has been noted that even after the stuttering has been treated and minimized, language problems persist. However, there is a paucity of literature regarding the over-all language abilities of stutterers. A study is needed to determine if language problems do exist among some of the stuttering population and if they can be differentially diagnosed by a description of the language parameters.

The relationship between language problems and motor

development has been supported by Karlin (1965) and Arnold (Luchsinger and Arnold, 1965). de Hirsh (1960) reports that most cases of severe language problems are combined with poor visual-motor and motor patterning. Pearson (1966) notes that language disability and expressive dysrhythmia are often related. The literature supports motor problems in conjunction with language problems. Locomotor function, psychomotor, dominance, balance and manual dexterity are all related to language development (Wood, 1964). Motor involvements such as confused lateral dominance, lack of coordination and disturbance of balance are often associated with auditory disorders (Myklebust, 1954).

The noted differences and disagreements concerning such terms as "congenital" and "acquired" language disabilities continues but there is little disagreement that gross and or minimal motor problems exist in connection with language problems.

The purpose of this study was to compare the language parameters of children who stutter and who have varying degrees of motor problems, to children who stutter and who have no motor problems.

Definitions

Motor problems.--The normal range of motorical development in children is broad. In order to establish the existence of a motor problem, a child must exhibit an

inability to perform muscle behavior tasks that most children his age can do well. A child's motor development is related to the adequate growth and integration of his central and peripheral nervous system and muscular system. Certain milestones have been established that mark expected motor accomplishments for the average child (Gesell, 1946). (When a child performs below the range set by norms as being average, then he can be diagnosed as having motor problems.) The motor problems were operationally defined for this study by the use of a standardized motor problems inventory which consists of four sections: small muscle coordination; large muscle coordination; laterality; and general observations. The general observations consisted of hyperactivity, perseveration, distractiblity, reading ability and writing ability (or Draw-A-Person). Motor problems are described as scoring below the normal range as determined on the test (described in Chapter II).

Stuttering.--Stuttering is characterized by abnormal dysfluencies and abnormal reactions to speaking. The dysfluencies are made up of repetition of initial sounds in a single word, repetition of a single syllable, repetition of single syllable words, blocking or prolonging the initiation of a sound. These dysfluencies are accompanied by feelings of frustration, social pain and embarrassment (Wingate, 1964).

Language.--Language is the systematic, arbitrary (learned) use of auditory and other symbols to transmit a variety of messages from one individual to another. During the transmission of a language message, both sender-feedback and receiver-feedback are in operation. Thus the ability of the sender to transmit a message depends on the integrity of his auditory, visual, tactual, kinesthetic, proprioceptive internal feedback and upon the auditory and visual feedback from the receiver. Along each of these channels, several levels of processing are required such as, sensation, perception, imagery, memory, closure, association, decoding, syntax planning, vocabulary selection, motor planning and execution and muscle response. These processes apply primarily to auditory and visual channels, although other channels may be used, i.e., tactual for the blind. This linguistic system is overlaid with a semantic system which involves words and their meaning.

Groups.--The stutterers were divided into three groups according to their ability to perform on an Experimental Motor Problems Inventory (MPI). The fifteen children whose MPI ratios were 0 to 1.50 (normal is 1) were the Control Group (C); the ten children who scored 1.51 to 2.49 on the MPI were Experimental Group One (E_1); and the fourteen who scored 2.50 or higher were Experimental Group Two (E_2).

Clutter-stutterer.--A stutterer who first exhibited symptoms of a clutterer. The definition of cluttering, according to Weiss (1964) is a speech disorder that is characterized by the clutterer's unawareness of his disorder, by a short attention span, by disturbances in perception, articulation and formulation of speech and often by excessive speed of delivery. It is a disorder of the thought processes preparatory to speech and based on a hereditary disposition.

Hypotheses

A. The language abilities of children with moderate motor problems who stutter (Group E_1) are not significantly different from other children who stutter (Group C).

Sub-Hypotheses that emerge by using the nine parameters and the language total defined by the ITPA:

1. There is no significant difference between Group E_1 and Group C in Auditory Decoding ability.
2. There is no significant difference between Group E_1 and Group C in Visual Decoding ability.
3. There is no significant difference between Group E_1 and Group C in Auditory Vocal Association.

Hypotheses--Continued

4. There is no significant difference between Group E_1 and Group C in Visual Motor Association.
5. There is no significant difference between Group E_1 and Group C in Vocal Encoding.
6. There is no significant difference between Group E_1 and Group C in Motor Encoding.
7. There is no significant difference between Group E_1 and Group C in Auditory Vocal Automatic.
8. There is no significant difference between Group E_1 and Group C in Auditory Vocal Sequencing.
9. There is no significant difference between Group E_1 and Group C in Visual Motor Sequencing.
10. There is no significant difference between Group E_1 and Group C in over-all language ability.

B. The language abilities of children with severe motor problems who stutter (Group E_2) are not significantly different from other children who stutter (C).

Sub-Hypotheses:

1. There is no significant difference

Hypotheses--Continued

between Group E_2 and Group C in Auditory Decoding ability

2. There is no significant difference between Group E_2 and Group C in Visual Decoding ability.
3. There is no significant difference between Group E_2 and Group C in Auditory Vocal Association.
4. There is no significant difference between Group E_2 and Group C in Visual Motor Association.
5. There is no significant difference between Group E_2 and Group C in Vocal Encoding.
6. There is no significant difference between Group E_2 and Group C in Motor Encoding.
7. There is no significant difference between Group E_2 and Group C in Auditory Vocal Automatic.
8. There is no significant difference between Group E_2 and Group C in Auditory Vocal Sequencing.
9. There is no significant difference between Group E_2 and Group C in Visual Motor Sequencing.
10. There is no significant difference between

Hypotheses--Continued

Group E_2 and Group C in over-all language ability.

C. The language abilities of children with moderate motor problems who stutter (Group E_1) are not significantly different from children with severe motor problems who stutter (Group E_2).

Sub-Hypotheses:

1. There is no significant difference between Group E_1 and E_2 in Auditory Decoding ability.
2. There is no significant difference between Group E_1 and E_2 in Visual Decoding ability.
3. There is no significant difference between Group E_1 and Group E_2 in Auditory Vocal Association.
4. There is no significant difference between Group E_1 and Group E_2 in Visual Motor Association.
5. There is no significant difference between Group E_1 and Group E_2 in Vocal Encoding.
6. There is no significant difference between Group E_1 and Group E_2 in Motor Decoding.
7. There is no significant difference between Group E_1 and Group E_2 in Auditory Vocal Automatic.

Hypotheses--Continued

8. There is no significant difference between Group E_1 and Group E_2 in Auditory Vocal Sequencing.
9. There is no significant difference between Group E_1 and Group E_2 in Visual Motor Sequencing.
10. There is no significant difference between Group E_1 and Group E_2 in over-all language ability.

Summary

The underlying assumption in the majority of research studies concerning stutterers is that they form a homogeneous group to be compared to a non-stuttering group. Other authors have proposed varying etiologies among the stuttering population. Such authors as Luchsinger and Arnold, Boome, Bluemel and Wyke are in contrast to Johnson, Sheehan and Karlin, for example. If significant differences do exist among stutterers, then the research should define the type of stutterer that is being compared to the non-stutterer.

Studies abound in the literature that are concerned with the correlation between motor problems and stuttering. Stutterers have been compared to non-stutterers and the results have been varied and contradictory. Kopp and Bilto are among the few researchers who found stutterers to

exhibit motor problems, while Finklestein and Weisberger, among others, found stutterers to be slightly superior in motorical ability.

Children who have motor disorders often have accompanying language disorders (Karlin, Pearson, and Wood). The language problems cover such aspects as dysgrammatism, short auditory memory span and disorganized language formulation, among others. This motor-language syndrome has been noted by clinicians and researchers, alike (de Hirsch, Weiss). The language problem appears to be related to the dysfunction of the central nervous system. The central motor-language disturbance has particularly been noted by researchers dealing with a "clutter-stutterer" population. In the area of language disorders, the auditory channel has received special attention. Results have varied here, also, but there have been strong indicators of auditory disturbances among stutterers.

A study designed to compare the language parameters of children who stutter and who have varying degrees of motor problems to children who stutter and who have no motor problems, is needed.

CHAPTER II

METHODOLOGY

Case Selection

The children for this study were stutterers selected from the caseloads of public school therapists. The criteria for selection was based on the presence of prolongations and syllable repetitions as measured by a stuttering severity scale. Thirty-nine children were taken from a group of 108 stutterers. They ranged from five years to nine years of age. The stutterers were functioning at grade level and they attended regular classrooms. Any disorder that would mask their language differences, such as cerebral palsy, mental retardation, or hearing has disqualified the stutterer. No bilingual children were used, nor any noticeably culturally different children. All children passed the audiometric pure tone tests of 500, 1000, 2000, 4000 Hz at 15 db ASA or 25 db ISO. It was assumed that an over-riding disturbance or difference could confuse the results.

Examiners

The examiners were graduate students in speech pathology, attending stuttering seminars. They were drawn from the seminars over a period of two years. They were trained in the administration of the tests used.

Group Selection

The stutterers were divided into three groups according to their ability to perform on an Experimental Motor Problems Inventory. The groups were not significantly different in regard to age or sex. An analysis of the age levels for the Control Group (C), Experimental Group One (E_1) and Experimental Group Two (E_2) showed that the C Group and E_2 Group were older than the E_1 Group but this difference was not statistically significant ($X^2 = 2.36$ with two degrees of freedom: .05 level of confidence requires a $X^2 = 5.99$) (see Table 1). The stutterers were tested on

TABLE 1

COMPARISON OF GROUPS C, E_1 AND E_2 BY AGE

	No Motor Problems	Moderate Motor Problems	Severe Motor Problems
Age Range	5 - 9	4 - 9	7 - 9
Age Mean	7.7	6.5	8.5

fifteen items of motor behavior. The items were: (1) lateral tongue movement, (2) confused laterality, (3) finger coordination, (4) repetition of "puh," (5) repetition of "puh tuh kuh," (6) stop and start phonation, (7) walk, run and skip, (8) hop without heel slap, (9) balance, (10) slap thighs, (11) hyperactivity, (12) distractibility, (13) reading delay, (14) Draw-a-Person or poor handwriting, (15) perseveration. The fifteen children whose Motor Problems Inventory (Riley, 1971) ratios were 0 to 1.50 (normal is 1) were the C Group; the ten children who scored 1.51 to 2.49 on the Motor Problems Inventory (MPI) were E_1 Group; and the fourteen who scored 2.50 or higher were E_2 Group.

A Stuttering Severity Instrument (Riley, 1969) and the Illinois Test of Psycholinguistic Abilities (ITPA) were administered to all stutterers.

Instrumentation

The ITPA was chosen because it was the most definitive, standardized test of language abilities available at the time. The test was standardized on 1,100 linguistically normal children who were randomly selected. They were between the ages of 2-0 and 9-0. Seven hundred of these children were included in the final sample. The test was based on the comprehensive Osgood Model of Communication Processes. The over-all test-retest stability coefficient was .97.

The MPI was chosen because the sub-tests specifically indicate the presence of fine motor coordination problems and gross motor problems, confused laterality and general motoric behavior such as hyperactivity, distractibility and perseveration. These latter observations have been significantly related to diagnosing children with minimal cerebral damage and congenital language disabilities (Strauss, 1947; Wood, 1959; Myklebust, 1954). The MPI cuts across three different parameters.

The over-all reliability of the MPI was conservatively estimated at .85 (see Appendix). The MPI is a standardized test and one of the more effective tests available.

The Stuttering Severity Instrument (SSI) was developed to be used in several research studies beginning in 1964 because the previously used methods were either general scales, self-reports, or numerical formulas. These methods were not selected because they did not meet all of the research criteria, namely: (1) simple enough to be used by a trained therapist, (2) as objective as possible (based on externally visible or audible components), (3) sensitive enough to register clinically significant changes, (4) acceptable statistical characteristics, re: reliability and validity, (5) normative data for assignment along the severity parameter.

These parameters were selected because they met

all of the applicable criteria. These parameters were: (1) frequency of repetitions, prolongation of sounds and syllables; conversational speech and reading, (2) duration of the longest blocks, (3) observable physical concomitants. (see Appendix).

The inter-examiner reliability of the SSI was .84 when a tolerance of two stens was allowed. In other words, 84 per cent of the judgments on each subject were within a two sten bracket. Frequency and duration were most reliable at .91; physical concomitants was less reliable at .62. Part/whole reliability studies yield a r_s correlation of .91 for frequency, .82 for duration and .86 for physical concomitants.

A validity study using eighteen stutterers and four therapists compared the Iowa Scale of Stuttering Severity (Johnson, Darley and Spriestersbach, 1963). The obtained r_s was .89. Normative data for the SSI is shown in Table 2.

To qualify for this study a child had to obtain a score of at least four on the SSI.

TABLE 2

NORMATIVE DATA OF THE STUTTERING SEVERITY SCALE

Severity Scale--Ages 4-13			
Sten	Per cent	Score	Severity
1	0-4	0-5	Very Mild
2	5-11	6-8	Mild
3	12-23	9-13	
4	24-40	14-15	Moderate
5	41-60	16-19	
6	61-77	20-23	
7	78-89	24-27	Severe
8	90-96	28-30	
9	97-100	31-45	Very Severe

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CHAPTER III

PRESENTATION OF DATA

Results

The results of this study indicate significant differences of the language scores at the .05 level of confidence when the Control (C) group was compared to both Experimental (E_1, E_2) groups and the Experimental groups were compared to each other.

The sub-tests of the 1961 Experimental form of the ITPA are shown in Table 3. They are listed to represent, first, the receptive areas (1 and 2), the associative areas (3, 4, 7, 8, and 9) and the expressive areas (5 and 6). The three groups and their standard deviation scores are recorded.

The C group showed a significant difference downward in the area of verbal expression (sub-test 5). Verbal expression tests the ability or willingness to talk. The low score may reflect the reluctance of a stutterer to talk as well as make specific statements about an object. Sub-test 8, auditory memory, requires the child to repeat numbers forward after the examiner. This test, too, was

TABLE 3

COMPARISON OF ITPA PROFILE MEANS OF GROUPS C, E_1 AND E_2

KEY:
1. Auditory decoding
2. Visual decoding
3. Auditory association
4. Visual association
5. Aud.-vocal encoding
6. Vis.-motor encoding
7. Aud.-vocal automatic
8. Aud.-vocal sequential
9. Vis.-motor sequential

CONTROL GROUP
No Motor Problems
n - 15

T - .3 sd

1 +.4	3 +.4	5 -.6
2 +.3	4 +.2	6 +.1
	7 +.2	
	8 -.5	
	9 -.1	

EXPERIMENTAL GROUP 1
Mild Motor Problems
n - 10

T - -.9 sd

1 +.5	3 -1.15	5 -.15
2 -.15	4 -.15	6 -.2
	7 -.3	
	8 -.7	
	9 -.25	

EXPERIMENTAL GROUP 2
Moderate to Severe
Motor Problems
n - 14
T - -1.05 sd

1 +.75	3 -.6	5 -1.0
2 0.0	4 -.25	6 0.0
	7 -.1	
	8 -1.1	
	9 -1.3	

significantly low. Stutterers, as a group, have trouble with their auditory memory. The next two groups have these problems, also, and in some cases in increasing amounts.

The E_1 group shows an added area of difficulty. This is the group with mild motor problems. The area of auditory association, sub-test 3, takes a very significant dip among this group. Another auditory channel is effected in the association area. Sub-test 5 and sub-test 8 again show up as being significantly low. E_1 as a group scores lower than the C group.

The E_2 group followed the consistent pattern of scoring low on sub-tests 5 and 8, except they dipped a full s below the mean. They scored low on auditory association, sub-test 3. In these 3 groups tested, E_2 scores more than 1 s below the mean on sub-test 9 which is visual motor sequencing. This is another test in memory, in which the child watches the examiner arrange pictures of geometric shapes and then he reproduces the sequence from memory.

Table 4 compares the groups. Sub-test 3 on this chart demonstrates that when the C group is compared to the E_1 group in the area of auditory association, there is a .001 level of confidence difference. There is a significant difference on this test, also, between the C group and the E_2 group.

When the E_2 group is compared to the C group on sub-test 9, there is a significantly lower score for the

TABLE 4

SIGNIFICANT DIFFERENCES AMONG GROUPS
(BASED ON THE MANN-WHITNEY U TEST)

ITPA sub-test	1	2	3	4	5	6	7	8	9	T
C to E_1 (lower)	.05 C	.05 E_1	.001 E_1				.05 E_1	ST* E_1		.025 E_1
C to E_2			.03 E_2	ST* E_2	.02 E_2		.05 E_2	.01 E_2	.01 E_2	.05 E_2
E_1 to E_2			ST* E_1					.025 E_2	.025 E_2	

*Strong trend but not significant at the .05 level of confidence.

E_2 group. When compared to the E_1 group, the E_2 group is still significantly lower.

A test that has not been mentioned is sub-test 1, auditory decoding, which is primarily a test of receptive vocabulary ability. All three groups scored relatively high on this test. There are several ideas as to the reason for this. One reason might be intelligence (Travis, 1959). One reason might be that stutterers develop an extensive vocabulary in order to circumvent a word they fear saying.

Referring to the total language scores, the C group had a language score of 0.3 s, the E_1 group scored a -.9 s and the E_2 group was a -1.05 s below the mean. Referring to the box at the bottom of the table, as before, it can be noted that statistically E_1 and E_2 rate lower than the C group in over-all language ability.

In general, the stutterers in this study are less able or less willing to express themselves verbally. Those with mild motor coordination problems are low on auditory association and over all language ability. Those with moderate to severe motor difficulties are somewhat low on auditory association but what sets them apart is their low scores on visual memory, and their low over-all language ability.

An incidental finding of this study was that the severity of both experimental groups was lower than that of the control group, but the difference was not

substantially significant at the .05 level of confidence (see Table 5).

TABLE 5

COMPARISON OF GROUPS C, E_1 AND E_2 BY STUTTERING SEVERITY

	No Motor Problem	Moderate Motor Problem	Severe Motor Problem
Range	7 - 32	4 - 25	7 - 31
STEN	2 - 9	1 - 7	2 - 9
Mean	20.2	17.5	17.1
STEN	6	5	5

Acceptance and Rejection of Hypotheses

A. Null hypothesis number one; the language abilities of children with moderate motor problems who stutter (E_1) are not significantly different from other children who stutter (C) was rejected on the basis of the rejection of the following sub-hypotheses:

1. There is no significant difference between E_1 and C in Auditory Decoding ability was rejected at the .05 level of confidence. The C Group was inferior.
2. There is no significant difference between E_1 and C in Visual Decoding ability was rejected at the .05 level of confidence.

The C Group was superior.

3. There is no significant difference between E_1 and C in Auditory Vocal Association was rejected at the .001 level of confidence. The C Group was superior.

7. There is no significant difference between E_1 and C in Auditory Vocal Automatic (grammar) was rejected at .05 level of confidence. The C Group was superior.

10. There is no significant difference between E_1 and C in over-all language ability was rejected at the .25 level of confidence. The C Group was superior.

B. Null hypothesis number two; the language abilities of children with severe motor problems who stutter (E_2) are not significantly different from other children who stutter (C) was rejected on the basis of the rejection of the following sub-hypotheses:

3. There is no significant difference between E_2 and C in Auditory Vocal Association was rejected at the .025 level of confidence. The C Group was superior.

5. There is no significant difference between E_2 and C in Vocal Encoding was rejected at the .025 level of confidence. The C Group

was superior.

7. There is no significant difference between E_2 and C in Auditory Vocal Automatic was rejected at the .05 level of confidence. The C Group was superior.

8. There is no significant difference between E_2 and C in Auditory Vocal Sequential was rejected at the .01 level of confidence. The C Group was superior.

9. There is no significant difference between E_2 and C in Visual Motor Sequencing was rejected at the .01 level of confidence. The C Group was superior.

10. There is no significant difference between E_2 and C in over-all language ability was rejected at the .05 level of confidence. The C Group was superior.

C. Null hypothesis number three; the language abilities of children with moderate motor problems who stutter (E_1) are not significantly different from children with severe motor problems who stutter (E_2) was rejected on the basis of the rejection of the following sub-hypotheses:

8. There is no significant difference between E_1 and E_2 in Auditory Vocal Sequencing was

rejected at .025 level of confidence. The E_1 Group was superior.

9. There is no significant difference between E_1 and E_2 in Visual Motor Sequencing was rejected at the .025 level of confidence. The E_1 Group was superior.

CHAPTER IV

CONCLUSIONS AND IMPLICATIONS

Specific Conclusions

A stutterer with motor problems exhibits an accompanying language syndrome. Stutterers who have moderate motor problems (Experimental Group I) demonstrate central language dysfunctions which include auditory perception and integration. This profile is one that is similar to an "aphasoid" child. The child has normal potential and performs normally or above on several language functions but he exhibits certain language deficits. His auditory system seems to confuse the input and his auditory reasoning ability is reduced. This coincides with Wingate's (1967) study which showed stutterers to have a reduced ability to decipher "slurvianisms" and the findings by Gregory (1969) that stutterers are less adept at multi-channel listening.

The stutterer with severe motor problems (Experimental Group 2) exhibits difficulties that are more closely associated with sensory-motor dysfunctions, (their over-all language score was the lowest of the three groups). This group shows an auditory associative deficit when compared

to the Control group but when compared to the E_1 (moderate motor problems) group, the E_2 group (severe motor problem) demonstrated less difficulty. They show a digression in the use of grammar, in the more automatic tasks of auditory memory and visual memory. The problem this group exhibits with a visual motor task may be indicative of (1) problems in discriminating, (2) motor manipulative ability, or (3) a true visual memory problem. The terms dysarthria or apraxia could be used to describe the E_2 group.

Several factors noted within both experimental groups provide supportive evidence for certain descriptive findings attributed to clutter-stutterers by Arnold and Weiss. Arnold notes a clutterer's difficulty with motor functions and he uses terms such as "congenital dyspraxia" and Bakwin's "developmental dyspraxia." He describes a clutterer as having a short auditory memory span, dysgrammatism, dysprasia and a deficit auditory feed-back system. This study, also, supports findings made by Weiss concerning the auditory feedback system and the poor memory of correct grammatical usage. According to Weiss, Liebman (1900) divided the clutterers into two sub-groups consisting of motor and sensory problems. The motor sub-group had accelerated speech and articulatory deviations and the sensory group had word finding problems as is found in aphasia. Weiss supplemented these two sub-groups with two more, one exhibiting formulation problems "corresponding

to transcortical aphasia" and one that utilizes interjection during the process of word finding.

The presence of language problems and the type of language problems has become an area that can no longer be ignored when describing a stutterer.

The three stuttering populations used in this study exhibited difficulty in expressing specific ideas. This could be attributed to a stuttering pattern of circumventing "fear" words or it could reflect a general reluctance to expand on ideas or engage in elaboration.

Conclusions Concerning Stuttering Research Methods

The need for differential diagnosis using language and motor parameters has been demonstrated by this study. To assume a homogeneity among stutterers is not feasible when comparing them to non-stutterers. For example, some stutterers exhibit more motorical involvement than other stutterers and they cannot be regarded as a single population. When stutterers are compared to non-stutterers, in such a case, the results do not reveal definitive information concerning the presence or absence of motor problems. Thus, conflicting evidence is frequently found. It has been noted in this study that some stutterers exhibit a significant deficit in auditory perception while others demonstrate only a slight dip in this area. When the

auditory feed-back system of stutterers is being compared to non-stutterers, the heterogeneity among them has to be taken into consideration. The existence of differences as indicated by this study, support findings by St. Onge and Calvert (1964), McCrosky (1957), Knott, et al. (1959) and others.

Implications

Implications of much of the research regarding stutterers are that they exist as a single population to be compared to non-stutterers. Once this assumption is evaluated in the light of evidence concerning the existing differentiality of stutterers, then the results can provide new meaning.

Some of the differences that should be considered for future research are as follows:

1. The stuttered speech may vary with a particular etiology. The frequency, duration, type of blocks and physical concomitants may produce a unique pattern when correlated with the etiology. It has been noted by Weiss and Arnold that a clutterer-stutterer produces a speech pattern that differs from other types of stuttering.
2. Since language and motor parameters participate in varying degrees in each stutterer's

pathology, research needs to be designed to determine which of the available therapies is effective in coping with these parameters. A stutterer who has been diagnosed as having central-language deficits will be given therapy designed to reduce or alleviate these problems, along with any other stuttering therapy being administered. A stutterer who exhibits sensory-motor problems should have therapy directed toward minimizing them and the related stuttering. A study that would compare systematic therapeutic procedures directed toward the problems noted and the use of more conventional approaches to stuttering would provide some useful results.

3. The category of stutterers described in this study parallel some medical categories such as hyperactive children who are "emotionally-driven" and hyperactive children who are "neurologically-driven" and children with learning problems with no medical involvement. The need for medical research with the differentially diagnosed stutterer is urgent. There is clinical evidence that a medical approach in conjunction with speech pathology can produce positive results in treatment of

some language-motor problems as well as some emotionally-oriented behaviors. For example, a double-blind pilot study (Wheeler, 1969) in which dilantin and placebos were used with children, indicated an improvement in the stutterers who were emotionally driven but less change in the stutterers with neurological involvement.

4. The language-motor parameters of some stutterers described in this study need to be evaluated in the light of the effect of operant conditioning. It is not enough to know if the fluency factor changes but information is needed on the effect of operant conditioning on the other parameters. The differentially diagnosed stutterer may provide some definitive information concerning operant conditioning.
5. The language-motor problems of some stutterers have been observed to have a high correlation with heredity factors by some authors (de Hirsch, 1966; Weiss, 1964; Arnold, 1965). A study that isolated the heredity factor of the various types of stutterers could indicate the relationship between a stutterer with central-language problems and heredity, for example, or the relationship between a stutterer with

sensory-motor deficits and heredity.

6. Since significant differences have been demonstrated among stutterers as measured by the language-motor parameters, perhaps the same type of study could be executed with other parameters such as emotional disturbance. The methodology of the study suggests that a variety of parameters could be utilized to differentially diagnose stutterers into significant groups. These parameters might be suggested by a factor analysis by means which certain factors may be isolated to form a definitive measure related to stuttering.

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APPENDIX

STUTTERING SEVERITY SCALE
Glyndon D. Riley

FREQUENCY (Use A or B, not both)

A. For "readers." Use 1 and 2				B. For "non-readers"	
1. JOB TASK		2. READING TASK		PICTURE TASK	
Per Cent	Task Score	Per Cent	Task Score	Per Cent	Task Score
1	2	1	2	1	4
2 - 3	3	2 - 3	4	2 - 3	6
4	4	4 - 5	5	4	8
5 - 6	5	6 - 9	6	5 - 6	10
7 - 9	6	10 -16	7	7 - 9	12
10 -14	7	17 -26	8	10 -14	14
15 -28	8	27 and up	9	15 -28	16
29 and up	9			29 and up	18

TOTAL FREQUENCY SCORE
A 1 & 2
or
B
[ ]

DURATION

Estimated Length of Three Longest Blocks	Task Score:
fleeting	1
one half second	2
one full second	3
2 to 9 seconds	4
10 to 30 seconds (by second hand)	5
30 to 60 seconds	6
more than 60 seconds	7

TOTAL DURATION SCORE
[ ]

PHYSICAL CONCOMITANTS

Evaluating Scale: 0 = none; 1 = not noticable unless looking for it; 2 = barely noticable to casual observer; 3 = distracting; 4 = very distracting; 5 = severe and painful looking.

1. Distracting SOUNDS. Noisy breathing, whistling, sniffing, blowing, clicking sounds, etc. 0 1 2 3 4 5

2. FACIAL grimaces. Jaw jerking, tongue protruding, lip pressing, jaw muscles tense, etc. 0 1 2 3 4 5

3. HEAD movement. back, forward, turning away, poor eye contact, constant looking around, etc. 0 1 2 3 4 5

4. EXTREMITIES movement. arm and hand movement, hands about face, torso movement, leg movements, foot tapping or swinging, etc. 0 1 2 3 4 5

TOTAL PHYSICAL CONCOMITANT SCORE

TOTAL OVERALL SCORE...

NAME _____

AGE _____ SEX _____

MOTOR PROBLEMS INVENTORY
By Glyndon D. Riley

Name_____ Age___ DOB___ Date_____

	None (0)	Some (1)	Much (2)
A. Small Muscle Coordination:			
1. Finger coordination	____	____	____
2. Two finger taping, right hand	____	____	____
3. Repetition of "puh" 10 secs ▱	____(26)	____(11-25)	____(0-10)
4. Repetition of "puh-tuh-kuh" ▱	____(14)	____(8-13)	____(0-7)
B. Laterality:			
1. Tongue-lateral alternating movement	____	____	____
2. Slap thighs with hands rapid, bilateral movement	____	____	____
3. Hand-Eye-Foot laterality ▱R L ▱R L ▱R L	____	____	____
C. Gross Motor Coordination:			
1. Hop without heel slap, smoothly	____	____	____
2. Balance on each foot ▱	____(15)	____(8-14)	____(0-7)
3. Walk, run, (skip)	____	____	____
D. General Observations:			
1. Hyperactive and restless	____	____	____
2. Perseveration on any task	____	____	____
3. Easily distracted	____	____	____
4. Poor reading for age	____	____	
5. Low DAP or poor handwriting for age	____	____	____
COLUMN TOTALS.....		▱ one point each	▱ two points each

TEST TOTAL..... ▱